



A.D. 1864, 16th DECEMBER. N° 3115.

S P E C I F I C A T I O N

OF

WILLIAM BARDWELL.

UTILIZING SEWAGE, &c.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

25, SOUTHAMPTON BUILDINGS, HOLBORN.

Price 1s.

1865.



A.D. 1864, 16th *DECEMBER*. N° 3115.

Utilizing Sewage, &c.

LETTERS PATENT to William Bardwell, Civil Engineer, of No. 4, Great Queen Street, Westminster, for the Invention of “**AN IMPROVED METHOD OF UTILIZING SEWAGE AND URINE, AND FOR FACILITATING THEIR PASSAGE THROUGH PIPES, THEREBY PREVENTING THE POLLUTION OF RIVERS AND STREAMS.**”

Sealed the 19th April 1865, and dated the 16th December 1864.

PROVISIONAL SPECIFICATION left by the said William Bardwell at the Office of the Commissioners of Patents, with his Petition, on the 16th December 1864.

I, WILLIAM BARDWELL, Civil Engineer, of No. 4, Great Queen Street,
5 Westminster, do hereby declare the nature of the said Invention for “**AN IMPROVED METHOD OF UTILIZING SEWAGE AND URINE, AND FOR FACILITATING THEIR PASSAGE THROUGH PIPES, THEREBY PREVENTING THE POLLUTION OF RIVERS AND STREAMS,**” to be as follows :—

These improvements relate, firstly, to the mode of treating sewage and urine
10 to adapt the same for agricultural and manufacturing purposes ; and, secondly,
to the mode of passing sewage and urine through pipes to prevent the clogging
or choking of the same. The sewage having been brought from cities, towns,
or villages to its outfall is recieved into tanks instead of into rivers and
streams, and deodorized, and afterwards pumped into tanks or pipes for
15 distribution over the soil. The solid matter may be precipitated with the
sulphate of lime from France or Belgium, used in quantities sufficient for the
purpose, and made into a manure. The sulphate of lime from France or
Belguim speedily separates the solid from the fluid matter, and being rich
in phosphates greatly enhances the value of the composition as a fertilizing

Bardwell's Improved Method of Utilizing Sewage, &c.

agent. The urine is taken from public or private urinals, the ammonia fixed by muriatic or sulphuric acid used in quantities sufficient for the purpose, a great part of the watery particles evaporated, and the residuum added to the sewage deposit made into a manure by being mixed with the sulphate of lime from France or Belgium, or it may be sold for manufacturing purposes. 5 To prevent the solid portion of the sewage from firmly adhering to the sides of the distributing pipes, thereby clogging or choking the bore, I pass alternately through the pipe the sewage in its normal condition and the supernatant liquid from the sewage or urine treated as before mentioned, which alternation has been found effectually to prevent the permanent adherence 10 of solid particles to the pipes.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said William Bardwell in the Great Seal Patent Office on the 12th June 1865.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, WILLIAM 15 **BARDWELL**, Civil Engineer, of No. 4, Great Queen Street, Westminster, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixteenth day of December, in the year of our Lord One thousand eight hundred and sixty-four, in the twenty-eighth year of 20 Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William Bardwell, Her special licence that I, the said William Bardwell, my executors, administrators, and assigns, or such others as I, the said William Bardwell, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times 25 thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for “**AN IMPROVED METHOD OF UTILIZING SEWAGE AND URINE, AND FOR FACILITATING THEIR PASSAGE THROUGH PIPES, THEREBY PREVENTING THE POLLUTION OF RIVERS AND STREAMS,**” 30 upon the condition (amongst others) that I, the said William Bardwell, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office 35 within six calendar months next and immediately after the date of the said Letters Patent.

Bardwell's Improved Method of Utilizing Sewage, &c.

NOW KNOW YE, that I, the said William Bardwell, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This Invention has for its object “An Improved Method of Utilizing Sewage and Urine, and for Facilitating their Passage through Pipes, thereby Preventing the Pollution of Rivers and Streams.”

DESCRIPTION OF THE DRAWINGS.

Figure 1 shows a plan of the usual works which will be required for carry-
10 ing out the Invention, the dimensions of which said works must be diminished or increased in proportion to the quantity of sewage in any city, town, or place; Figure 2, a section of the same works.

For these purposes the sewage is taken from its outfall or some other place to sewage works by a pipe or culvert (by pumping or by gravitation, alternately
15 with the sewage used for irrigation in its normal state, when or where it is preferred to use sewage in its normal state. Sulphate of lime (burnt gypsum), commonly called plaster of Paris or plâtre-en-pierre, by preference that made from the gypsum of France, Belgium, Norway, or Sweden, is made into a hydrosulphate of lime, and allowed to run with the sewage into the sup-
20 ply basin or bowl in the proportion of half a ton or more to one million gallons of sewage; or the sulphate of lime may be sifted in a dry form in like proportions over the sewage in the basin, bowl, or tank. From the supply basin or pipe the sewage rushes into the mixing bowl in such a manner as to produce a centrifugal motion, by which the sewage and the deodorants become
25 thoroughly intermixed in their passage to the depositing tank (see Drawings). Midway, vertically in the depositing tank, and covering two-thirds at least of its horizontal area, is placed on a grating of galvanized iron a rapid filtering bed of gravel and sand about eighteen inches thick, through which filtering bed, propelled by the head of sewage, the purified liquid percolates upward
30 and runs into the clear water reservoir, leaving behind the solid matters. This reservoir must be of proportionate capacity to the flow of sewage, and its contents may be pumped up or allowed to flow out by gravitation, and be used for irrigation, as being sufficiently fertilizing for most crops, having retained some of the soluble salts, and absorbed some of the sulphate of lime.
35 When necessary sulphuric or other acid in or about the proportion of three pounds to each ton of sewage, or the sulphate of iron, or the sulphate of alumina, or the perchloride of iron, in like proportion, is made to run in with the sewage in the manner above described. When the depositing tank is

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fully charged with solid matters, the sewage is turned into another mixing bowl and tank, where the process is repeated. In the meantime a sluice in the first tank is opened, and the sediment let out into a sump, or long pit, common to all the tanks. It may be raised from thence by an endless chain of buckets connected with an endless chain of rakes, or by other means, 5 worked by steam or by other motive power, into a chamber having a sloping and porous or other floor, in which chamber each hundred pounds of sediment is mixed with ten or more pounds of the above-described sulphate of lime and two or more pounds of chloride of sodium or other chemicals, as may be found expedient. The mixture without the application of heat is then ready 10 for removal and sale. Over each basin, or bowl, or tank is a cone, in which are hung baskets, containing oxide of manganese, coke moistened with diluted muriatic acid, or sawdust moistened with diluted sulphuric acid, to absorb and crystallize the evolved ammonia for utilization. The urine is received into a tank either beneath or on one side of the public urinals, and taken from 15 thence to a laboratory, where it is treated according to its dilution with a sufficient quantity of sulphuric acid or other mineral acids to fix the ammonia, it may then be evaporated to any required strength, and the acids neutralized, and be used for dyeing or other purposes, or converted into a dry and friable compound, by the admixture of sulphate of lime, and added to the sewage 20 deposit or sold separately.

Having thus described the nature of my Invention, and the manner of performing the same, I would have it understood that what I claim is the new principle involved in the alternate use of sewage in its normal state and sewage in its purified state for the irrigation of land; the new principle embodied 25 in the use of sulphate of lime, by preference that from France, Belgium, Norway, or Sweden, for disinfecting sewage and urine and making sewage manure and other compounds therewith; and the new principle involved in the peculiar or similar building arrangements, tanks, and processes herein described for effecting these objects. 30

In witness whereof, I, the said William Bardwell, have hereunto set my hand and seal, this Twelfth day of June, in the year of our Lord One thousand eight hundred and sixty-five.

(L.S.) WILLIAM BARDWELL.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1865.

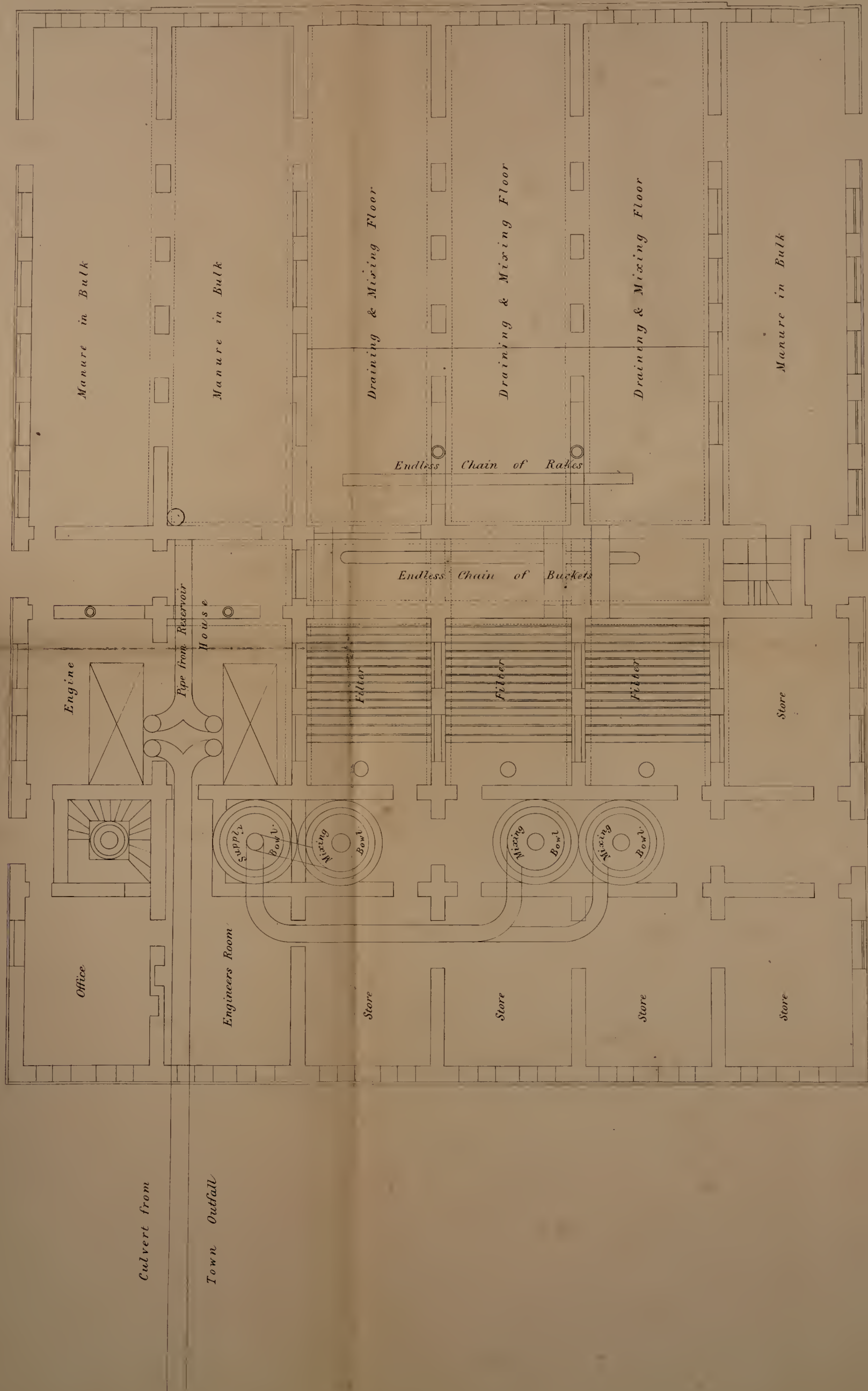


FIGURE 1.

Ground Plan.
Scale of Feet.
10 20 30 40 50

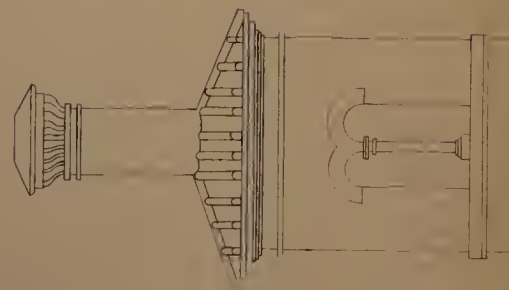
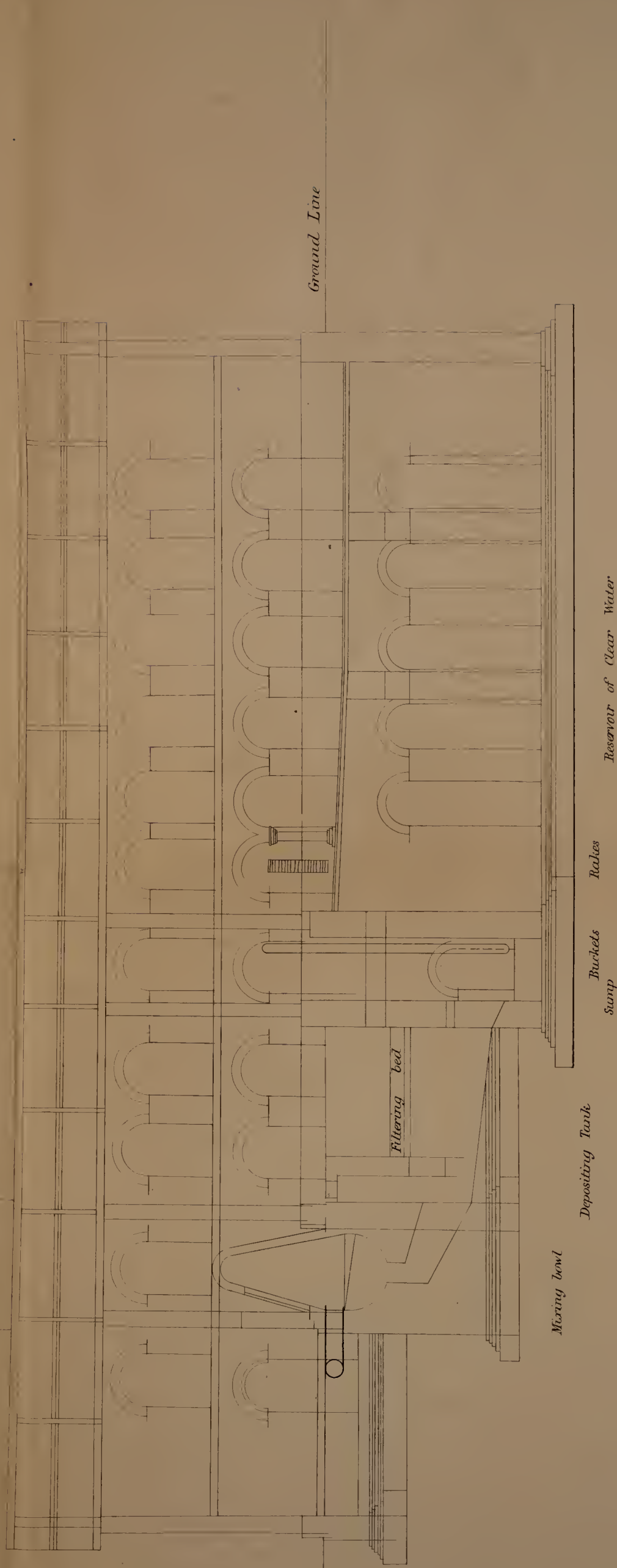


FIGURE. 2.



Section

The filed drawing is partly colored

